



CSOP 034 – PREHOSPITAL BLOOD ADMINISTRATION

Version No: 1.1

Effective date: 21 March 2022

APPROVALS

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Next Review Date:	Feb 2023		

History

<u>Effective date</u>	<u>Version no</u>	<u>Summary of Amendment</u>
21 March 2022	1.1	NUH blood bank email update

Purpose

This clinical SOP outlines the procedures for the supply, carriage, and administration of prehospital blood products by TAAS. It has been agreed by Nottingham University Hospital and University Hospital Coventry Blood Transfusion Laboratories.

<u>Abbreviations</u>	<u>Definitions</u>
pRBC	Packed red blood cells
FFP	Fresh Frozen Plasma
TXA	Tranexamic acid
MHP	Massive Haemorrhage Protocol (at hospital)
SBP	Systolic Blood Pressure
GCS	Glasgow Coma Scale
NHSBT	National Health Service Blood and Transfusion
BTL	Blood Transfusion Laboratory (at NUH or UHCW)



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TRS	Transfusion Record Sheet (filled out after administration of blood)
SABRE	Serious Adverse Blood Reactions and Events (MHRA reporting system)
BTR	Box Tracking Record (filled out by staff handing over blood boxes/products)

TAAS carries packed red blood cells (pRBC) and fresh frozen plasma (FFP) for the prehospital resuscitation of patients with life-threatening haemorrhage.

Emergency blood components are a precious and limited resource, and there are risks associated with blood administration. TAAS clinicians will ensure all efforts to preserve blood volume have been undertaken prior to and during transfusion, that blood components are not given unnecessarily, and that wastage of blood is avoided.

Blood transfusion represents only one part of a holistic approach to the patient with major haemorrhage. Patients also require, where applicable:

- Control of external haemorrhage
- Splinting the pelvis and fractured long bones
- Maxfax haemorrhage control
- Early administration of TXA (1g for adults or 15mg/kg for children)
- Prevention of hypothermia
- Prevention of hypocalcaemia
- Activation of MHP at receiving hospital
- Rapid transportation to appropriate hospital for definitive haemorrhage control

Clinicians must also consider, assess and treat alternative potential causes for altered physiology (other than haemorrhage) eg tension pneumothorax, cardiac tamponade, spinal cord injury, anaphylaxis or a hypotensive response to medication.



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Indications for prehospital blood transfusion

Traumatic or non-traumatic major haemorrhage

AND

Sustained clinical signs of hypoperfusion where volume resuscitation is deemed necessary prior to arrival at hospital

Principles of permissive hypotension should be used. Caution is warranted when the patient has a penetrating injury with a single major vessel injury where existing blood clot is precariously achieving haemostasis. A SBP <90mmHg is not an absolute indication for pre-hospital blood transfusion - if the GCS is 15 with a palpable radial pulse in a young patient then transfusion may not be necessary prior to arrival at hospital. Absolute haemodynamic thresholds for transfusion are difficult to quantify and should be considered on a case-by-case basis balanced with the risks of prolonged hypotension on subsequent multi-organ dysfunction.

Caution should be taken in elderly patients who have less physiological reserves to cope with hypotension. Caution must also be made in interpreting signs of shock in pregnant patients and children who will compensate significantly before deterioration.

In the context of traumatic cardiac arrest, blood transfusion may be indicated early in resuscitation when hypovolaemia is judged to be a contributing factor.

Consent for blood transfusion

National recommendations state that informed consent should be given prior to administering any blood transfusion. In the patient cohort receiving emergency pre-hospital blood transfusion it is highly unlikely they will be able to give informed consent and clinicians should act in the patient's best interests. If the patient or relative would like further information, the following NHSBT patient information leaflets will be carried in the fluid warmer bag:

NHSBT – Receiving a Blood Transfusion.

<https://nhsbtdeb.blob.core.windows.net/umbraco-assets-corp/23998/inf1580-1-receiving-a-blood-transfusion-print-friendly.pdf>



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NHSBT - Information for patients who have had an unexpected blood transfusion

<https://nhsbtdeb.blob.core.windows.net/umbraco-assets-corp/14669/160915-27614-unexpected-transfusion-blc6991p-final.pdf>

Carriage of blood components

- TAAS will carry and administer blood components in accordance with NUH/UHCW policies and guidance.
- 2 units of Group O Rh (D) negative packed red blood cells (pRBC) and 2 units of thawed fresh frozen plasma (FFP) Group AB or A will be carried in a 2 litre Series 4 Credo box with a data logger and transfusion record sheet (TRS) paperwork.
- QMC will provide boxes 1-4 on rotation and UHCW will provide boxes 5-8 on rotation. Spare boxes labeled 9-10 are stored at Coventry airbase if required.
- The blood transport box will be packed in the order so that the first component to be removed from the box is FFP, followed by pRBC, then FFP, then pRBC.
- The boxes will maintain a temp of 2-8 degrees for up to 47 hours if unopened.
- The blood transport box must only be opened when the decision has been made to transfuse blood components. A maximum of 1 pRBC and 1 FFP can be removed and the lid closed **immediately** to maintain the temperature of the transport box for the remaining units.
- In total the blood transport box can be opened briefly on 3 separate occasions whilst maintaining a steady state temperature. The box can only be opened for a 4th time if the final unit is being removed for transfusion. Opening the box outside of this validated schedule will compromise the cold chain and result in wastage of any returned blood components to the BTL.
- At a scene with multiple patients, the blood components in the box can be administered to more than one patient. However traceability of each unit to the correct patient is essential, and each patient will require a fully completed TRS with the correct unit numbers allocated.



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- **Once the blood transport box has been opened for a mission, it CANNOT be used again for a further tasking later in the duty period.** The box must remain sealed with the completed paperwork, and returned to the issuing BTL at the pre-agreed box handover times for each base.
- TAAS crew should consider from the available dispatch information whether to take blood to scene from the aircraft/car.
- If further blood units are required (eg trapped patients who exceed four units) TAAS crews should consider requesting further air ambulance assets for support via ambulance control or enacting the trauma network 'Blood to Scene' protocols:
<https://nebula.wsimg.com/141b38a7c1732214e34c0228394b3385?AccessKeyId=71C7B1EA5618F4C499E1&disposition=0&alloworigin=1>
- To maintain a continuous supply and avoiding wastage of blood components, blood transport boxes should be returned to the distributing blood transfusion laboratory (BTL) every 24 hours for repacking. If the Blood Bike service is not available, or the crew are out with the box at the time of collection, the duty crew are responsible for returning the box to the distributing BTL by a maximum of 30 hours after original delivery.
- There is currently no service to provide 'hot repacking' if blood components have been used before the planned restocking time.
- The Box Tracking form (Appendix 1) needs completion by BTL, blood bikes and the duty TAAS crew each time the box is handed over from one team member to the next.

Administration of blood components

- Pre-transfusion bloods will not be necessary before pre-hospital blood administration. After transfusion of 4 units of pre-hospital blood components, the blood type of the patient will still be detectable. There are significant risks of bringing pre-hospital unlabeled blood bottles in with the patient.
- There are no age or sex restrictions for the blood components carried by TAAS.



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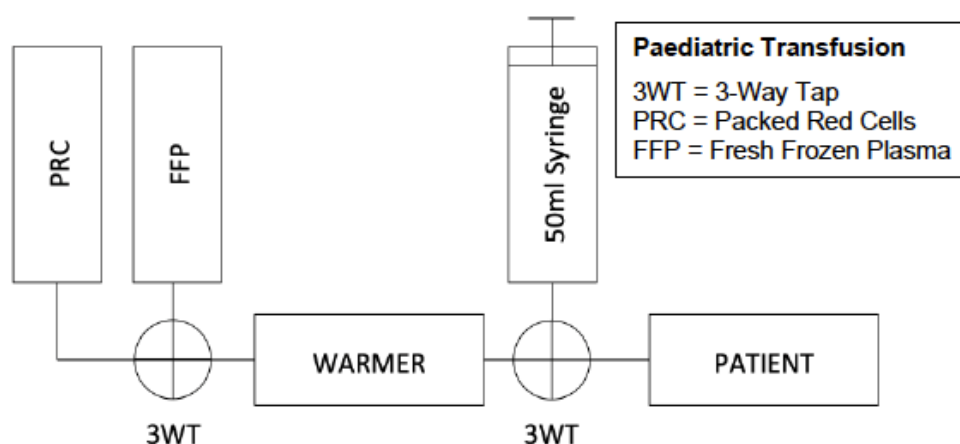
- Patients must have a documented set of observations including pulse, BP, SaO₂, RR and temperature before blood administration and after blood has been given.
- Before transfusion each unit of blood must be checked by a challenge and response by two personnel – one of which must be TAAS staff:
 1. Visual inspection of unit (look for discoloration, haemolysis, large clots)
 2. Confirm blood type
 3. Confirm expiry date
- Blood components must be given via a double-chambered blood filter giving set with a fluid warmer. All TAAS staff must be trained and competent in the use of the blood warmer.
- To set up:
 1. A bag of saline must be run through the TAAS blood giving set
 2. The primed giving set should be attached to the fluid warmer
 3. The checked blood component can then be spiked directly on to the primed giving set – this method will prevent risk of air bubbles and occlusion of the giving set.
- The order of transfusion should be FFP – pRBC – FFP – pRBC to provide a balanced transfusion.
- Adult patients should receive one unit of blood components before reassessment and paediatric patients should receive boluses of 10mls/kg.
- 10mls 10% calcium chloride must be given routinely after 4 units of blood components have been administered (0.2ml/kg in children after 20mls/kg volume of transfusion). Ideally this should be through a separate cannula. Where this is not possible, where blood is already running, a 10-20ml saline flush must be given both before and after the calcium chloride injection to prevent mixing in the line.
- Gold standard vascular access is via a peripheral venous cannula. Transfusion through an intraosseous needle or a small cannula, will require a 3 way tap on the patient side of the warmer and a large Luer-lock syringe to draw warmed blood and provide pressure to transfuse a specific volume.

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- Drugs should not be administered via the vascular access used for transfusion unless pre and post saline flushes can be used.
- The diagram below demonstrates the set-up for transfusion in paediatric patients <30kg to allow blood components to be transfused in 10ml/kg boluses in a 1:1 PRBC to FFP ratio without wastage.



Traceability

- The Transfusion Record Sheet (TRS) paperwork inside the blood transport box must be kept safe and used to document blood administration after handover at hospital (see Appendix 2). The completion of the TRS is mandatory to ensure 100% traceability for every unit of blood component.
- TAAS staff must complete all fields after transfusion has occurred. This must be done in a calm environment (i.e. not on scene) to avoid transcription errors.
- The TRS must be photographed and added to the TAAS database for each patient.
- The transfused units should also be recorded on the ambulance service Patient Report Form



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including type of blood component, unit number and expiry date for each transfused unit.

- The **distributing BTL must be emailed a copy of the TRS when blood has been transfused** and the transport box is being returned. The following email addresses should be used:

QMC:

UHCW:

- The TRS must be returned within 24 hours of blood transfusion. If the blood box is unopened and all blood components are being returned, then no TRS is necessary. The original TRS can be returned in the back pocket of the Credo blood box.
- The responsibility for each individual blood transport box and its contents lies with the team from the base to which the box was issued. For example if both Helimed 54 and Helimed 53 are on scene, they will be responsible for all aspects of care and documentation of the specific transport box issued to their base.
- If blood components from one box have been administered to two patients, then a TRS must be completed for each patient with the correct units on each.

Handover at hospital

- Handover to the lead consultant at hospital must explicitly state that pre-hospital blood transfusion has occurred, in the ATMIST handover and after handover, before clearing. The receiving hospital will need to specify the prior administration of blood on the request form for the Group and save sample. This will save confusion in BTL in the case of mixed field reactions.
- The TAAS crew should ring the BTL themselves from the resus phone with the patients new hospital number to ensure the message is passed that the patient has received prehospital blood.



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- Unused units of pRBC or FFP **must not** be passed to the receiving hospital and must be kept in the blood box. If the hospital does not have blood components immediately available for an exsanguinating patient, the **TAAS clinician must stay with the blood until it has been administered and record this on the TRS as a prehospital transfusion.**
- Used blood bags should be retained in a clinical waste bag until the TRS has been completed. Used blood bags should be disposed of in an appropriate clinical waste bin.

Acute transfusion reactions

- All clinicians must be vigilant for signs of severe acute transfusion reactions (ATRs). These will be covered in annual training. It may be challenging to identify these signs in patients who are already critically unwell but should be suspected if there is any sudden deterioration after starting transfusion eg increased pulse, low BP, wheeze, hypoxia, rash, increased temperature.
- If in doubt STOP the transfusion and retain the giving set and unit of blood/FFP for testing. Report the effects at the receiving hospital and hand over the unit of blood/FFP for testing at the receiving hospital.
- Treat anaphylaxis as per the Resus Council guidelines and treat urticarial rash from allergic reaction with Chlorpheniramine IV.
- All serious adverse reactions or events as detailed by the MHRA in their guidance on reporting to SABRE will be notified by The Air Ambulance Service to the distributing BTL at QMC/UHCW. The hospital transfusion team will be responsible for generating a SABRE for SHOT.
- Any incidents arising from prehospital emergency blood transfusion must be reported via the TAAS IR1 system and the TAAS clinician leads for blood transfusion notified.



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Recall

It is a requirement of the Blood Safety and Quality Regulations (SI 2005 50) that all blood components that are considered to pose a risk to patients, are withdrawn from use. Recall may be internal or external. In both cases, the blood components must be withdrawn rapidly from use ensuring that patients are not placed at risk. If a recall notification is received TAAS duty crews must:

- Quarantine the blood transport box and all contents.
- Return the box to the distributing BTL for testing and investigation.

Internal Recall

Examples include:

- Suspected Transfusion Reaction – during transfusing or post transfusion.
- Failure of Cold Chain – the box has been left opened (approaching, at or over 30 minutes) and there is a risk to the cold chain.
- Laboratory error - unit issued may be incorrect
- A unit of blood has leaked and contaminated the other units

Action:

The complete blood transport box must be quarantined and returned to BTL

Following a potential transfusion reaction, the blood unit/s responsible must be placed in a bag with the giving set attached and handed over to the receiving hospital to send to their BTL. The issuing BTL will also need to be informed of the issue so they can have direct communication with the receiving hospital BTL.

External Recall

On occasions, the BTL may be asked by an external source to trace and withdraw the component and return it to the requesting source e.g. NHSBT (National Health Service Blood and Transfusion) for the following reasons:

- Donation(s) considered to be a microbiological risk.
- Donation(s) found to have been collected from donor who did not meet standard acceptance criteria, e.g. following post donation notifications.
- Problems identified with donation testing.



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- Problems identified with quality of raw materials e.g. blood bag faults.

Action:

In any of these events the distributing BTL staff will inform the TAAS duty crew of the details of which component is to be recalled.

Unit not transfused: TAAS will quarantine the complete blood transport box and return to the issuing BTL. The issuing BTL will attempt to provide a replacement box if this is early in the shift but may need to wait until the routine replacement time.

Unit has been transfused: BTL will liaise with the TAAS duty crew to establish patient details and receiving hospital. Both parties will report and investigate any potential adverse events.

The distributing BTL will be responsible for liaising with NHSBT directly and externally reporting to SABRE if necessary.

Training for administration

TAAS clinicians must have completed full training in prehospital blood transfusion and been signed off by the TAAS Deputy Clinical Lead (or deputizing staff) before they are permitted to authorise and administer blood components to patients. This applies to all doctors and paramedics.

All doctors and CCPs must undertake the NHSBT 'Learn Blood Transfusion' competency modules annually and provide certification of the following:

- LBT: Acute Transfusion Reactions
- LBT: Blood Components and Indications for Use
- LBT: Consent for Transfusion
- LBT: Safe Transfusion Practice
- LBT: Safe Transfusion Practice for Paediatrics

All staff (regardless of previous training) are required to undertake specific TAAS pre-hospital blood transfusion training – this can be delivered virtually and via cascade training on an annual basis. A competency-based assessment will confirm knowledge prior to sign-off.



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Any changes to blood transfusion practices will be disseminated via the TAAS red-green system to ensure every staff member is aware.

A nominated TAAS paramedic will be responsible for maintaining records of training and prompting annual updates for all staff.

Every administration of blood components and any missed opportunities for prehospital transfusion (eg blood components awaiting restock) will be audited internally by TAAS and shared with QMC and UHCW BTL on a quarterly basis. The TAAS report will form a standing item on the agenda of the local Hospital Transfusion Committee (HTC) meeting.

Acknowledgements: Great North Air Ambulance, Essex & Herts Air Ambulance, and Londons Air Ambulance who shared their SOP's and experience with TAAS staff.

ANNEX/APPENDIX

Document Reference Number	Document Title
1	Box Tracking Record (BTR) Form – NUH & DLR54
2	Box Tracking Record (BTR) Form - UHCW & WNAA53
2	Transfusion Record Sheet (TRS) – NUH & DLR54
3	Transfusion Record Sheet (TRS) – UHCW & WNAA53

End of Document